AMENDMENTS

In the Specification:

Please replace the paragraph starting on Page 13, Line 9 with the following:

The third zone 22 contains a catalyst suitable for catalyzing a high-temperature shift reaction in the reaction stream. Examples of suitable high temperature shift catalysts are those that are operable at a temperature in the range of between about 300°C and about 600°C. Preferably the high-temperature shift catalyst includes transition metal oxides, such as ferric oxide (Fe_2O_3) and chromic oxide ($Cr_2\cancel{O}[O]_3$). Other types of high temperature shift catalysts include iron oxide and chromium oxide promoted with copper, iron silicide, supported platinum, supported palladium, and other supported platinum group metals, singly and in combination.

Please replace the paragraph starting on Page 14, Line 20 with the following:

As disclosed in FIG. 3, the fuel steam and air feeds are preferably mixed inside the reactor housing 12 (not shown in FIG. ~~1~~[3]) by a means for cooperating the means for flowing oxygen and the means for flowing fuel such that the flow of fuel assists the flow of oxygen. In the preferred embodiment a jet ejector 54 is provided such that the fuel-steam issues at a higher velocity from a smaller-diameter tube, such as a nozzle 56, disposed in the axial center of a portion of the air tube 50. As mentioned before, this reduces the amount of work being done to deliver the requisite amount of air because jet ejector 54 pulls the air, thereby minimizing requirements for upstream pressurization. The mixing location (i.e., the location of jet ejector 54) is chosen to minimize the

chance of ignition of reactants before they reach the vessel 34, while ensuring satisfactory fuel/steam/air mixing.

Please replace the paragraph starting on Page 17, Line 18 with the following:

FIG. 5 discloses a schematic cross section of a reformer reactor 76 with a spherical geometry. Nested, adjacent spherical zones 78, 80, 82, and 84 are provided in a geometry which permits a flow path P3 to direct reaction stream flow in diverging radial directions (along spherical coordinates) from the first zone 78, into and through the sequentially downstream zones ~~80-84~~ [80, 82, and 84] and then into a collection space 86 defined by a spherical outer shell 88. A spherical partial oxidation reaction vessel 90 (with openings, not shown) is provided at the center of the first zone 78. A fuel/steam tube 92 is disclosed schematically by hatched line. The tube has an inlet 94 and passes through the zones to effect the advantageous heat exchanges disclosed with respect to reactor 10. Similar preheat tubes could also be provided for air/oxygen.

Please replace the paragraph starting on Page 18, Line 3 with the following:

FIG. 6 discloses a schematic cross section of a reformer reactor 96 with a cylindrical geometry such as reactor 10. However, reactor 96 has a first zone 98, which is adjacent to two second zones 100, 102, which are in turn adjacent to two third zones 104, 106, which are adjacent to two fourth zones 108, 110. Each zone is cylindrical; thus the geometry permits a flow path P4 to direct reaction stream flow in 180 degree diverging axial (rather than radial) directions from the first zone 98, into and through the sequentially downstream zones ~~100-110~~ [100, 102, 104, 106, 108, and 110,] and

then into collection spaces 112, 114. As noted earlier, this diverging axial flow effectively doubles the throughput through the cylindrical cross section at a given pressure (or reduces the pressure required for a given throughput) as compared to conventional axial-flow reactor configurations. A partial oxidation reaction vessel [may be] ~~116 is~~ provided at the center of the first zone 98 and could be fed reactants through counterflow, helically coiled, feed stream tubes such as tubes 48, 50 of reactor 10. A cylindrical reactor housing 118 is provided with a thermally insulating cover 120 to assist in coinciding the direction of significant portions of thermal loss with the direction of reaction stream flow.

Please replace the paragraph starting on Page 18, Line 26 with the following:

In all of the reformer reactors 10, 60, 76 and 96: partial oxidation of a hydrocarbon fuel may be conducted outside the reactor and a partially oxidized hydrocarbon reaction stream be fed into the first zones 18, 62, 78, and 98. Optionally, a partial oxidation reactor such as vessels 34, 90~~, and 116~~ can be located within the first zones. Also optionally, a reaction stream may be fed into the first zones 18, 62, 78 and 98, in a thermal condition for steam reforming therein. In all of the reformer reactors 60, 76 and 96, catalysts may be employed as desired in the various zones including the first zones 18, 62, 78 and 98.

Please replace the paragraph starting on Page 19, Line 13 with the following:

Tubes such as tubes 48,50 of reactor 10 could be used in the same way in each reactor 10, 60, 76 and 96, to achieve the same heat exchanges for preheating reactants and for providing an advantageous thermal gradient across catalyst zones. All of the boundaries between zones in each

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of the reactors [10,] 60, 76, and 96 are permeable to reaction stream flow. Permeable partitions disposed between zones, such as, mesh screens, expanded metal, reticulated ceramics, or the like, can be provided for this purpose.

Please replace the Abstract of the disclosure on Page 37 of the Application with the following:

A reformer for producing a hydrogen-rich gas includes a first zone, a second zone, a third zone, a fourth zone and a product gas collection space. The zones are sequentially adjacent. A flow path is provided for directing flow of a reaction stream in diverging directions from the first zone into the second zone, and continuing in the same general diverging directions through the second zone, third zone, and fourth zone. Directing the flow in diverging directions permits flow into and through a zone over more that just a single cross-sectional geometry of the zone or a single cross-section of the flow path transverse to the direction of flows. This configuration can be used to require a lower pressure for flowing the reaction stream so as to reduce the parasitic requirements of the reactor, and can also be used to increase throughput of the reactor.